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THE EFFECT OF DECIDUOUS CUSPID EXTRACTION ON THE IMPA ANGLE*

(10) Brett H./Mueller,
Paul P./L'Homme,
Fred A./Schoenbrodt
William A./Ayer

Brett H. Mueller, DDS**
Chief of Pedodontics
Major, US Army Dental Corps
MEDDAC
Ft. Meade, MD 20755

Paul R. L'Homme, DDS
Chief of Orthodontics
Colonel, US Army Dental Corps
Kimbrough Army Hospital
US Army Dental Detachment
MEDDAC
Ft. Meade, MD 20755

Fred A. Schoenbrodt, DDS, MS
Orthodontist Private Practice
9058 Chevrolet Drive
Ellicott City, MD 21043

William A. Ayer, DDS, Ph.D.
Chief, Dept. Prof. Development
Major, US Army Dental Corps
USAIDR
Walter Reed Army Medical Center
Washington, D. C. 20012

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**Present address: Walter Reed Army Medical Center; Box 456, Washington, D.C. 20012

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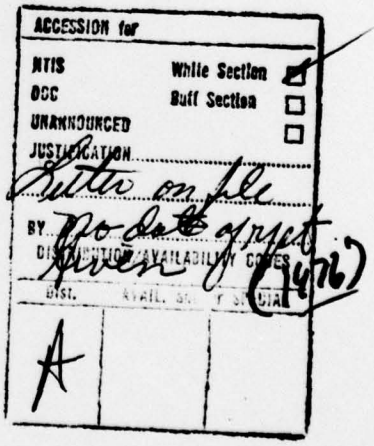
ABSTRACT

The purpose of this paper was to determine the effect of deciduous cuspid extractions on the IMPA angle. Records were reviewed of 340 children receiving mixed dentition orthodontic care. Twenty-two (22) were found to have had no lingual arch placed after deciduous cuspid extraction. The analysis of the data revealed that no child lost IMPA if the initial FMIA was 65 degrees are greater before extractions. As the FMA increases over 28 degrees one can expect to lose IMPA after deciduous cuspid extraction. Of the 22 patients who had deciduous cuspids extracted, 10 patients lost IMPA and 12 patients had no change or an increase of IMPA. The findings strongly suggest that in patients with normal FMSs' and FMIAs' the extraction of the deciduous cuspids will not appreciably affect the IMPA. The extraction of deciduous cuspids without a thorough orthodontic work-up as described is strongly discouraged if the clinician does not place a lingual holding arch.



The extraction of mandibular deciduous cuspids to facilitate better alignment of the mandibular permanent incisors in mixed dentition arch length discrepancy cases is a controversial issue. Most authors feel that the loss of the deciduous cuspids will cause the permanent incisors to become more upright or lingually inclined.[1,2,3,4] Moorrees' research showed that as the mandibular permanent incisors erupt the deciduous mandibular cuspids move laterally. When these teeth come into occlusion with the deciduous maxillary cuspids, they in turn are moved laterally (secondary spacing) and the space created enables the permanent maxillary lateral incisors to emerge into a favorable alignment. If the deciduous cuspids are extracted when this natural phenomenon is occurring, secondary spacing may not occur.[5]

In some mixed dentition patients, mandibular deciduous cuspid extraction may be a useful treatment technique. In an arch length discrepancy case, the lower permanent incisors are allowed to gain a more favorable position on the alveolar arch, with no other appliance but the tongue and lips.

If the lower permanent incisors upright or fall back after the extraction of deciduous cuspids one would expect a decrease of the incisal mandibular plane angle (IMPA--Fig. 1--as measured on a lateral cephalometric X-ray). The resultant loss of IMPA angle would translate to 2.2 mm of arch length circumference loss per degree negative angle change.[6] The purpose of this paper is to determine the effect of deciduous mandibular cuspid extraction on the IMPA angle.

MATERIALS AND METHODS

The data for the present study were obtained from the records of 340 children initially accepted for mixed dentition care orthodontically. Each patient accepted in the Pedo-Ortho program at Kimbrough Army Hospital during 1974-1975 had a diagnostic work-up which included the following: Panorex radiograph; bite-wing and anterior maxillary and mandibular periapical radiographs; diagnostic casts; Moyers' Mixed Dentition Analysis (75 percentile of reliability); and a cephalometric tracing (including Tweeds' triangle).[7]

The children were conjointly evaluated by an orthodontist and a pedodontist. A diagnosis and treatment plan were developed for each child.

The children who had lower deciduous cuspids extracted had been selected according to the following criteria: 1. Lack of arch length clinically, with crowding of the lower four permanent incisors which included, (a) ectopic eruption positions, (b) rotations, or (c) stripping of the labial plate of bone periodontally; 2. The problem would not be resolved by disking of the deciduous cuspids.

Of the total 340 children initially accepted for Mixed Dentition care orthodontically, 22 children were found to have had no lingual arch placed after deciduous cuspid extraction. Following the extractions, these 22 children had been evaluated at monthly intervals for up to one year. All children in the program had final records taken including a cephalometric radiograph before referral for civilian dental care.

The completness of the records thus enabled a relatively detailed review of the 22 children and an evaluation of any change in Tweeds' triangle,

(FMA, IMPA and FMIA).

RESULTS AND DISCUSSION

Table 1 shows the distribution of the 22 patients according to sex; initial Tweeds' triangle (FMA, IMPA, and FMIA); and the duration in months from extraction of the deciduous cuspids to the taking of the final cephalogram, (average time was 8 months). The cephalogram taken at the end of the study was also traced and included the final Tweeds' triangle evaluation. The last column shows the degree difference of the IMPA before and after treatment.

The data were subjected to a Wilcoxin-matched pairs signed rank test to determine if there were subsequent changes of IMPA space following extraction of the deciduous canines. The results of the analysis yielded a significant T value ($p < 0.01$) thus indicating that there were significant changes of space following the extractions.

Of the 22 patients who underwent deciduous cuspid extraction, 10 patients exhibited a decrease in IMPA, 7 patients showed an increase in IMPA and 5 patients revealed no change in IMPA angle.

The 12 patients who had no change or a gain in IMPA had an iniital FMA average of 28.0 degrees, IMPA average of 86.0 degrees and an FMIA average of 66 degrees. Of the 10 patients who lost IMPA their initial FMA average was 30.9 degrees, IMPA average of 90.9 degrees and their FMIA average was 58.2 degrees. The initial Moyers' mixed dentition analysis showed an average of -3.4 mm on the 12 patients showing no change or gains of IMPA and an initial -0.86 mm on the 10 patients that lost IMPA.

Tables 2, 3, and 4 depict the effect of deciduous cuspid extraction on Tweeds' triangle (FMA, IMPA and FMIA). Of the 10 patients losing IMPA: 8 patients had an initial FMA of 28 degrees of greater and 2 patients had an initial FMA of 27 degrees or less. Five (5) patients had an initial IMPA of 90 degrees or greater and 5 patients had 89 degrees or less. Ten (10) patients had an initial FMIA of 64 degrees or less and no patients lost IMPA if their initial FMIA was 65 degrees or greater.

From Tables 1-4, it will be noted that the arrangement of the data strongly suggests that after deciduous cuspid extraction one can expect changes in IMPA under relatively specific circumstances based on initial FMIAs and FMAs.

Of the 10 patients who lost IMPA after extraction, all had initial FMIAs' of 64 degrees or less. No patient with an initial FMIA of 65 degrees or greater lost IMPA after deciduous cuspid extraction. This observation strongly suggests that children with FMIAs' of 65 degrees or greater may not need space maintainers after or during deciduous cuspid extraction therapy.

Of the 10 patients who lost IMPA, 8 patients had an initial FMA of 28 degrees or greater and 2 patients had a FMA of 27 degrees or less.

It was interesting to note that the data indicated that the degree of crowding affected the initial IMPA inversely after extractions. Most clinicians generally believe that the more crowding there is, the more uprighting or falling back of the incisors after deciduous cuspid extraction. The 12 patients who had either no changes or gains in IMPA had an initial

Moyers analysis average of -3.4 mm and the 10 patients that lost IMPA had initial Moyers analysis of -0.86 mm.

Thus the value of cephalometric analysis prior to deciduous cuspid extraction is apparent. The extraction of deciduous cuspids without a thorough orthodontic work-up as described is strongly discouraged if one does not place a lingual holding arch.

CONCLUSIONS:

One can expect to lose IMPA or arch circumference after deciduous cuspid extraction if the child presents with an initial FMIA of 64 degrees or below.

If the initial FMA is 28 degrees or greater one can probably expect to lose IMPA if deciduous cuspids are extracted.

One may tentatively suggest that in patients with normal FMAs' and FMIAs' the extraction of the deciduous cuspids will not appreciably affect the IMPA. Space maintainers may not be needed in this child.

Of the 22 patients who had deciduous cuspids extracted, 10 patients lost IMPA and 12 patients had no change or an increase of IMPA.

The findings of this study should be replicated with a larger patient sample.

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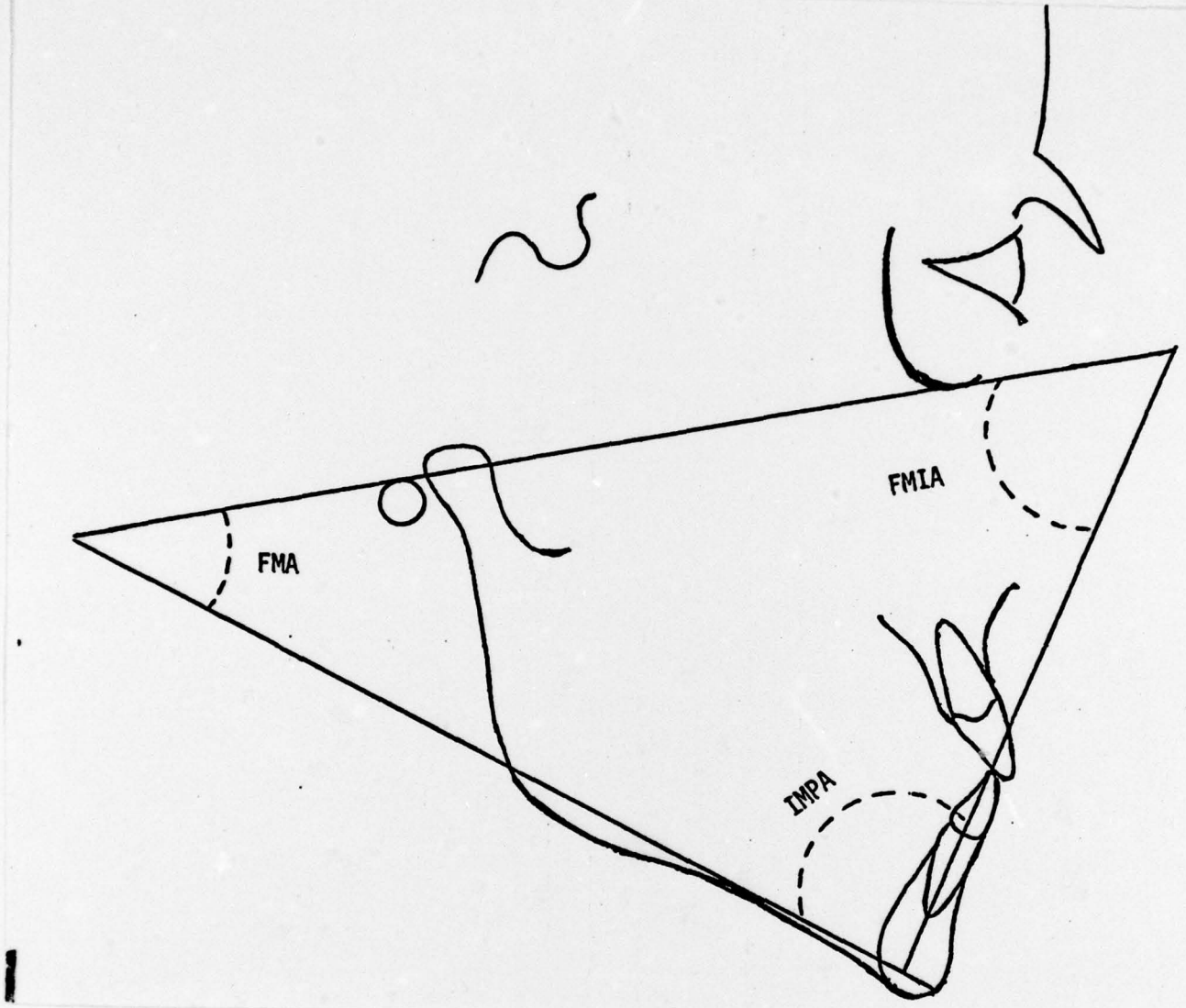

FIGURE 1. Tweeds' Triangle.

Table 1. Data for patients in present study

		Pre Measurements					Post Measurements			
Patient Number	Sex	FMA	IMPA	FMIA	Moyers	Follow-up Ceph in months	FMA	IMPA	FMIA	Change in FMIA
1	F	32	88	60	-5.0	8	32	84	64	-4.0
2	F	26	92	62	+0.2	6	25	89	66	-3.0
3	M	28	96	56	+0.4	12	25	95	60	-1.0
4	M	34	88	58	-4.1	5	32	80	68	-8.0
5	F	41	75	64	-2.3	9	44	71	65	-4.0
6	F	40	89	51	0	8	38	87	55	-2.0
7	M	29	87	64	-3.2	8	32	84	64	-3.0
8	M	21	96	63	+5.3	12	22	94	64	-2.0
9	F	28	100	52	+0.6	7	30	98	52	-2.0
10	F	30	98	52	-0.5	8	32	88	60	-10.0
11	F	33	80	67	-2.0	6	31	81	68	+1.0
12	M	24	92	64	-3.1	5	20	94	66	+2.0
13	M	25	85	70	-4.2	7	20	90	70	+5.0
14	F	21	94	65	-6.8	6	22	94	64	0
15	F	31	76	73	-9.6	12	28	78	74	+2.0
16	M	33	89	58	+1.2	12	34	89	56	0
17	M	23	90	67	0	12	23	90	67	0
18	M	32	87	61	-2.6	8	35	90	55	+3.0
19	M	18	84	78	-1.3	4	16	86	78	+2.0
20	F	31	84	65	-5.2	3	26	84	70	0
21	F	32	90	58	-1.3	7	29	90	61	0
22	F	34	82	64	-6.0	12	30	91	59	+9.0

TABLE 2. Effects of deciduous extraction on Tweeds' Triangle according to FMA.

	Decrease IMPA	Increase IMPA	No Change
FMA 28 degrees and above	8 patients	4 patients	3 patients
FMA 27 degrees and	2 patients	3 patients	2 patients

TABLE 3. Effects of deciduous extraction on Tweeds Triangle according to IMPA.

IMPA	Decrease IMPA	Increase IMPA	No Change
90 degrees and above	5 patients	1 patient	3 patients
IMPA 89 degrees and below	5 patients	6 patients	2 patients

TABLE 4. Effects of deciduous extraction on Tweeds Triangle according to FMIA

	Decrease IMPA	Increase IMPA	No Change
FMIA 65 degrees and above	0 patients	4 patients	3 patients
FMIA 64 degrees and below	10 patients	3 patients	2 patients